WHITE PAPER

APPLICATION ACCESS TO WEB SERVER

9/6/96

This paper describes a possible methodology for using an application client in place of browser to communicate with and obtain information from a Web server. This is provided as additional information in connection with technical specifications and process documents submitted to AT&T in August, 1996. The intent is to show the feasibility of this approach. This approach is beyond the scope of the initial interface required by the Georgia PSC.

The basic architecture for Web technology involves a Common Gateway Interface (CGI) request sent to the server with a stream of data returning as the result set.

The best way to understand HTTP protocol is to use an example. Our example will be Bob's T-Shirts.

The browser or application (client) opens a socket connection to whatever port the web server is using on the host machine. The client then sends a Uniform Resource Locator (URL), to the server. A URL contains several elements and may look something like this:

```
GET http://cotton.bobs-t-shirts.com/pricequery.pl:80?itemnum=WXYGFV11&qty=14&loc=GA HTTP/1.0
```

The following is an explanation of the above string: The GET reference is sent to the domain, cotton.bobs-t-shirts.com on the specified port, 80, using http as the protocol. The CGI script on Bob's server that provides the provides the response to the user is pricequery.pl. The .pl extension indicates that pricequery.pl is a PERL script. The query string, consists of tagged strings separated by ampersands (&). The format of the query strings must be understood by the receiving CGI program. The client waits for the server to return the data.

The web server executes pricequery.pl using the parameters the client specified in the query string. In this case, it specified that the item number (itemnum) is WXYGFV11, the quantity (qty) is 14, and shipping (loc) is to Georgia. The specifics of the parameters must be negotiated prior to system development.

There is another method, POST, that allows more information than will fit into a GET method query string. Basically, with POST, the client sends the URL but instead of a query string you send a stream of tagged lines of data. Normally, a Web browser submitting a form with the POST method used would send these data strings automatically, based on the form information. A client application, however, is forced to emulate the performance of such a browser. It must send the data, specifying content length and then the data stream itself, as a group of <tag>=<value> pairs.

The CGI script (pricequery.pl) returns the response to the server for forwarding to the client. The information being returned to the client can be formatted in several ways. If the client is a browser, the response would be formatted as an HTML page that would be displayed in the browser in a formatted fashion. As an alternative, the response from the server can be [text] output that looks like this:

```
HTTP/1.0 200 Document follows
Date: Wed, 04 Sep 1996 16:21:14 GMT
Server: NCSA/1.4.2
Content-type: text/plain
Last Modified: Wed, 04 Sep 1996 16:21:06 GMT

itemnum=WXYGFV11
qty=14
loc=GA
available=11
cost=11.44
shipcost=12.22
```

Once the response is sent, the server terminates the connection. If for some reason the client terminates the connection before the server responds or during the response, the server assumes the client no longer desires the information and disposes of it.

The only issues to resolve are what data is to be sent and returned. The information can be formatted in a variety of ways, including a visual format (HTML) that could be easily viewed from a browser. This provides several debugging methods for client coding, including simply viewing the query results.

As could be seen with the results above, it's a very simple matter to extract the data returned from the server and process it in any way desired. For browser-based solutions, a web form would be utilized and the CGI program would produce HTML-formatted output (With the `Content-type: text/html` instead of `text/plain`). This output would draw a formatted screen for the user. In the app-to-app environment, the client would specify that it was an application, and the CGI program would respond with a tagged data string format such as the one above. At that time, the client is free to operate upon the received data however it chooses. In the above example, the system could parse the response data and execute an automatic order that would send another query to Bob's web site.

To summarize:

- To start a communication with the web server, clients must connect via TCP/IP sockets to the web server port on the server host
- Requests from the client may come in the form of a GET method or via the POST method which requires specification of lengths. Both methods require specification of several client configuration parameters such as client type and the data types desired by the client.
- After the request, the socket connection remains open while the client awaits a response. If the connection is closed for any reason, including the client session timing out, the session is considered terminated by both sides and must be reinitiated by the client.
- The client will receive a stream of data that is the server response to the query. For browser-based clients, this will be HTML hypertext to be displayed on the browser. For app-to-app clients, this will be tagged-pair data to be parsed by the client application.
- The connection will be broken by the server at the end of response.

ATTACHMENT 2

PLACE: Dobbs Building, Raleigh, North Carolina

DATE: Thursday, September 25, 1997

TIME IN SESSION: 2:00 P.M. TO 4:57 P.M.

BEFORE: Commissioner Jo Anne Sanford, Presiding
Commissioner J. Richard Conder
Commissioner Allyson K. Duncan
Commissioner Judy Hunt
Commissioner Ralph A. Hunt
Commissioner Robert V. Owens, Jr.
Commissioner William R. Pittman

IN THE MATTER OF:
DOCKET NO.: P-55, SUB 1022
BellSouth Telecommunications, Inc.
BellSouth's In-Region InterLATA Service Pursuant to Section 271 of the Telecommunications Act of 1996

Volume 7

A P P E A R A N C E S:

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EXHIBITS IDENTIFIED

EXHIBITS ADMITTED

GC MCI Cross Exhibit 1	--
GC MCI Cross Exhibit 2	--
GC AT&T Cross Exhibit 1	--

like RNS and DOE, have -- have worked with the LENS developers to develop the programming code.

Q. All right. And I'm more interested in perhaps the functions that BellSouth sought to include in LENS. Has there been any comparison of the functions they sought to include in LENS with corresponding functions in RNS or DOE that you're aware of?

A. Well, there is -- throughout the development process of LENS, there is -- there has been a need to identify which functions that it needed to perform, and that's been done by working with the people who've had responsibility for the corresponding functions in RNS and DOE, so --

Q. And that's working in the development of the system itself.

I'm actually --

A. (Interposing) Correct.

Q. I'm sorry.

I'm actually more interested in the basis for your testimony here today that BellSouth believes its access is nondiscriminatory. And what I'm interested in is whether there is any analysis recorded in which BellSouth compares the functions available in LENS with the functions available in RNS and DOE for preordering.

MR. ELLENBERG: Counsel must mean other than the prefiled testimony which does that point by point, I'm assuming, in the question?

MR. STOUGHTON: I am. Thank you, counsel.

A. And that was sort of my next answer, I have done that in the course of preparing my testimony, and as reflected by my testimony I have worked with each of the systems and worked with the experts from all the systems to understand the functions and the comparison of them, and that's what is reflected in my testimony.

Q. (MR. STOUGHTON) Okay. But other than what's in your testimony you're not aware of any recorded analysis comparing the LENS and -- and BellSouth functionality for its preordering systems?

A. No, that was the purpose of my testimony.

Q. Okay. Have you done any analysis of the compa- -- -- of a comparison of the timeliness with which BellSouth provides functions to itself and BellSouth provides functions to the CLPs through its OSS?

A. I've looked at it from the perspective of -- you know -- well, I say in my testimony it's substantially the same time and manner that timing is -- if I'm a BellSouth representative using a retail system can I get that information while I'm talking to the customer, and

using the CLP systems, making that judgment as well, I'm able to get that information on line on a Realtime basis while I'm talking to the customer. In terms of system level response times -- you know -- I mean, I -- from that perspective in substantially the same time and manner, I haven't been too interested in whether it was two tenths of a second, then one, or whatever. But I think Mr. Moore has been so --.

Q. And Mr. -- I'm sorry.

A. So -- you know -- if you're talking about the kind of measurements of -- in seconds, then that's a better question for Mr. Moore.

Q. Okay. We'll ask Mr. Moore.

Have you done any comparison between BellSouth's OSS and the CLP OSSs of the -- the accuracy with which the OSSs handle particular activities?

A. That was -- well, let me see -- let me make sure -- I can interpret that question a number of ways, so let me make sure I understand your meaning. If you could -- I'm not sure I understand your question.

Q. Well, why -- why don't you tell me the way you're interpreting it, and then go ahead and give your answer.

A. Okay. For example, we talked a little earlier about the fact that a letter had been sent to advise the

CLPs that we had seen some unexpected results in due date calculation.

And so, yes, there has been some analysis to see or -- you know -- what prompted that letter was the fact that there had been some analysis of, let's look at what kind of due dates we're getting from LENS versus other systems. And that again has been a joint effort between the LENS and the DOE and the RNS programmers.

Q. And as LENS has been operating over the several months, have you looked at error rates for transactions entered through LENS, and compared that with error rates for similar transactions through RNS or DOE?

A. I'm not -- I'm not getting a good clear picture of what you mean by error rates for transactions.

Q. Have you looked at -- in more broad terms, have you looked at the quality with which BellSouth's OSS systems operate compared to the quality with which the LENS and EDI interfaces operate?

A. I'm not aware that anybody has looked and said, let's compare the quality of this versus the quality of that. I mean, that's kind of a -- a broad and nebulous term.

As I mentioned a minute earlier, Mr. Moore has

been looking at system level response times. There has been joint efforts of the programmers to be sure that the code in the various system -- the programming codes in it various systems was producing the same results.

You know -- I think that a lot of that kind of analysis is just intuitively obvious when you use the system if you expect to get telephone numbers back when you ask for telephone numbers then you get them. I'm not sure how you analyze the quality of that. If you get them in both cases, the system is doing what it's designed to do.

There are -- I guess you could say that the user acceptance testing that was done as part of the systems development is an analysis of the quality.

Q. And is that documented -- the analysis you've just described?

A. I don't know.

Q. Okay. Are you aware that -- whether any of the analyses you've just described are documented?

A. I believe Mr. Moore has some documentation.

Q. As -- as to the timeliness measures?

A. Yes.

Q. You're not aware of that, whether any of the quality related analyses we've just discussed are

documented, I take it, is that right?

A. I want to make sure as I answer that that I'm not representing what I just described as being quality-related analyses done for the purpose of looking at the quality of the system.

There are a number of things that were done throughout the process of developing this system that could fall in that category, you seem to be looking at that as a particular term of art so I -- I just want to make sure that I'm clear about that.

Q. Well, let me tell you what I'm looking for, so -- so we're clear on this.

This Commission has an obligation to evaluate whether your OSS, BellSouth's OSS are being provided in a nondiscriminatory fashion. If -- if this Commission chooses to follow the FCC's guidance then they would look at such things at the functionality, the timeliness and the quality with which BellSouth is providing OSS services to CLPs as compared to how BellSouth provides similar services to itself.

And what I'm asking ultimately is whether BellSouth has done any analysis of those questions.

And what I've heard so far is that other than what's in your testimony, there is no formal analysis,

but correct me if I'm wrong?

A. Well, I may have said -- let me try this because there is a lot wrapped up in there. Throughout the process of developing there -- these systems there have been a number of activities that relate to the things that you described.

Whether that's all been pulled together and documented outside my testimony as a quality analysis, I'm not aware of that, I don't know. You know -- I can't say that there hasn't been that done.

Q. It has not been made a part of this record in any event, is that correct, to your knowledge?

A. Right, a written document has not been made a part of this record, but I would say that by virtue of our having demonstated the comparable systems to the Commission we've provided information that assists in making that kind of determination.

Q. Okay. And other than that that information related to the ongoing efforts over a period of -- of months and perhaps longer, you're not aware of any specific analysis BellSouth has done to determine whether its provision of OSS services is nondiscriminatory, is that correct?

A. I guess the -- the way I'd have to answer that

question is to say that the -- the marching orders given to the systems designers was to provide nondiscriminatory access, so everything that's been done in the development of this system has been done with a view of making a determination as to what was necessary to provide nondiscriminatory access. And my testimony is a summary of that activity.

Q. Okay. And -- and now you're at the point in time at which BellSouth says we've done it, provided nondiscriminatory access. And my question is now that you've reached that point, have you done any analysis, is there any analysis that says now that we've reached this point this is how we know at BellSouth because we've done this analysis that we're there?

MR. ELLENBERG: Chairman Sanford, I'm going to object. This question has been asked and we keep circling back to it, I think. It's very repetitive at this point. What's in the record will speak for itself, I believe, and I think Ms. Calhoun has described what she has put in her testimony and elsewhere.

MR. STOUGHTON: Madam Chair, I'm prepared to move on, would it please the Commission.

CHAIR SANFORD: Thank you.

Q. (MR. STOUGHTON) Ms. Calhoun, are you familiar

PLACE: Dobbs Building, Raleigh, North Carolina

DATE: Friday, September 26, 1997

TIME IN SESSION: 9:00 A.M. TO 4:55 P.M.

BEFORE: Commissioner Jo Anne Sanford, Presiding
Commissioner J. Richard Conder
Commissioner Allyson K. Duncan
Commissioner Judy Hunt
Commissioner Ralph A. Hunt
Commissioner Robert V. Owens, Jr.
Commissioner William R. Pittman

IN THE MATTER OF:

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Volume 8

APPEARANCES:

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done to assure itself that it's providing nondiscriminatory access?

A. Yes, with respect to volume testing and functional testing.

MR. STOUGHTON: I'd like to have marked for identification AT&T Calhoun cross-examination exhibit number four, and I'll ask that it be distributed to the Commission and the witness and counsel, please.

GC AT&T CROSS EXHIBIT 4

(Identified)

(Exhibit passed out.)

MR. STOUGHTON: For the record, AT&T cross exhibit four is an excerpt of the Ameritech Order. It's paragraph 212 of the Ameritech Order exerted, and with the footnotes submitted. And I'll be referring to only a portion of it here.

Q. (MR. STOUGHTON) Ms. Calhoun, what I'm going to be doing here, just so we can perhaps shorten up this a little bit, there are seven numbered items in the -- I guess it's the first paragraph sentence of this paragraph, and I will represent to you that it's types of data that the FCC suggested to Ameritech, that Ameritech should provide in a subsequent 271 application.

What I want to do is just ask you whether you're aware of whether BellSouth has data in each of these areas. So if we could go through these one by one.

Q. The first area is average installation intervals for resale. Are you aware of whether BellSouth has information collected in that area?

A. I think I would have to defer on that answer to Mr. Moore, but -- well, something else about your question that concerned me.

What you handed me is labeled "Empirical OSS Evidence Required by the FCC", and your description was information that was suggested by the FCC.

MR. STOUGHTON: Madam Chair, I'm prepared to strike the title on this. We can line through that if that's a problem for the witness.

CHAIR SANFORD: That's fine.

Q. (MR. STOUGHTON) On item number one, you say you need to defer to, was it, Mr. Moore?

A. Yes.

Q. All right. Item number two is average installation intervals for loops.

Are you familiar with whether there is data available in BellSouth on that category?

A. Again, I would defer to Mr. Moore.
Q. All right. How about item number three, comparative performance information for unbundled network elements?
A. Again, maybe I could short circuit this if we're going to go through one through seven, I think I would have to defer to another witness on all of these.
Q. Okay. And do you know that Mr. Moore does have information or could respond to these areas?
A. I don't know that for a fact but we would be the -- the likely candidate.
Q. You simply know it's not you, right?
A. That's correct.
Q. Okay. Thank you.
MR. STOUGHTON: Let me -- I said -- I said thank you and that probably indicated to you that I was done but I guess I'm not --
A. (Interposing) Oh!
Q. -- quite.
A. Okay.
Q. When you arrived at your conclusion which you testified to here that BellSouth is providing nondiscriminatory access to its OSS, I take it then you did not rely on any of the types of data that are

described in items one through seven, is that a fair statement?

A. That's correct. I relied on my experience with BellSouth's retail system, my experience with the CLPs systems, my experience with both having and observing customer contacts, and how that information is actually used in the course of the customer contact. So I was looking at it from the customer's perspective, the functionality that was available, and how it would affect the CLPs ability to serve its customers, as well as looking at it from a perspective of whether the volumes and capacity of the systems were sufficient to support the forecasted volumes.

Q. And I know we talked about this yesterday, and I asked you yesterday quite a series of questions about whether you knew of analyses in BellSouth that -- that you might have relied upon to establish nondiscriminatory access.

I want to ask you a -- what I hope is a simpler and more narrow question now, and that is other than the documents that are in your testimony, or referred to in your testimony, did you personally rely on any other documents in arriving at your conclusion that the BellSouth OSS are nondiscriminatory?

A. No.

And -- I have primarily relied on using the systems, just working with the systems, and working one-on-one with the developers and experts for the various systems.

(Mr. Stoughton and Mr. Campen confer.)

Q. (MR. STOUGHTON) Ms. Calhoun, I believe I'm almost done, but what I want to do with you now is -- is go through some features, and what I'm going to be asking you is whether RNS provides the feature and whether the equivalent, BellSouth offered OSS or CLPs, provides a similar capability or the same capability.

And to the extent that I'm replowing some ground I apologize, I just haven't been able to keep track of whether you've been asked all these questions. So, some of them you may have been, and I apologize in advance for that.

When you showed us RNS in your demonstration, you showed us that when a section was completed there was a change to the color of the button to indicate that it was completed.

Would you agree there is no equivalent function in LENS or EDI?

A. While I would agree that there is no equivalent

ATTACHMENT 3